

Application No.: 10/091,945

Docket No.: JCLA6897

**REMARKS****Present Status of the Application**

The drawings are objected under 37 CFR 1.83(a). The Office Action rejected all presently-pending claims 1-14. Specifically, the Office Action rejected claims 1 and 3-8 under 35 U.S.C. 102(e), as being anticipated by Aquien et al. (U.S. 2002/0163064). The Office Action also rejected claims 1,2, 4-8 and 10-14 under 35 U.S.C. 102(e) as being unpatentable over Mihara. (JP 2000-332160). The Office Action rejected claims 9 under 35 U.S.C. 103(a), as being anticipated by Aquien et al. (U.S. 2002/0163064). Applicants have amended a drawing and the specification to overcome the objection and have amended claims 1, 7, 10, 13 to improve clarity. After entry of the foregoing amendments, claims 1, 7, 8, 10, 13 and 14 remain pending in the present application, and reconsideration of those claims is respectfully requested.

**Summary of Applicant's Invention**

The Applicant's invention is directed to a cavity down ball grid array packaging carrier. The carrier includes a heat spreader, a ground substrate and a substrate. The ground substrate is bonded onto the heat spreader and has an opening exposing the heat spreader. The substrate having a via and a ground pad is bonded onto the ground substrate. The ground pad is spaced apart from and electrically connected with the ground substrate through the via.

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**Discussion of objections**

According to the OFFICE ACTION, the drawings were objected under 37 CFR 1.83(a) because the drawings do not show every feature of the invention specified in the claims. In response thereto, applicants have amended the reference number 500 to 510 in the paragraph [0028] for corresponding with the meaning of the sentence therein and further have amended Fig. 7. Every feature in the amended Claims 1 and 10 is shown in Fig. 7 and no new matter is entered.

**Discussion of Office Action Rejections**

The Office Action rejected claims 1 and 3-8 under 35 U.S.C. 102(e), as being anticipated by Aquien et al. (U.S. 2002/0163064). The Office Action also rejected claims 1,2, 4-8 and 10-14 under 35 U.S.C. 102(e) as being unpatentable over Mihara. (JP 2000-332160). Applicants respectfully traverse the rejections for at least the reasons set forth below.

The present invention is directed to a cavity down ball grid array packaging carrier. The carrier, as shown in amended FIG. 7, includes a heat spreader 510, a ground substrate 520 and a substrate 550. The ground substrate 520 is bonded onto the heat spreader 510 and has an opening 502 exposing the heat spreader 510. The substrate 550 having a via and a ground pad is bonded onto the ground substrate 520. The ground pad is spaced apart from and electrically connected with the ground substrate 520 through the via. The ground substrate 520 has an enough thickness and has an enough large surface to provide a stable ground reference. Therefore, the cavity down ball grid array packaging carrier of the present invention has a high quality of electricity. Moreover, for example, a patterned wiring layer functioning as ground

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reference cannot be formed in the substrate 550, thereby the substrate 550 having more space to allocate wires for transmitting signals or the substrate 550 can save a patterned wiring layer functioning as ground reference.

It should be also noted that the ground substrate does not belong to one of the patterned wiring layer of the substrate.

The features are recited in claims 1, and 10. For example, independent claim 1 recited the features.

With respect to claim 1, independent claim 1 recites the features as follows:

1. A cavity down ball grid array packaging structure, comprising:
  - a heat spreader;
  - a ground substrate bonded onto the heat spreader, the ground substrate having an opening exposing the heat spreader;*
  - a substrate bonded to the ground substrate, wherein the substrate comprises at least an insulating layer, a patterned wiring layer, and a via electrically connected to the ground substrate, and the patterned wiring layer comprises at least a ball pad, a first contact pad, and *a first ground pad spaced apart from and electrically connected to the via;*
  - a chip having an active surface and a corresponding back surface, the chip bonded into the opening of the ground substrate and onto the heat spreader via the back surface thereof, the chip including at least a second contact pad and a second ground pad, the second contact pad and the second ground pad positioned on the active surface of the chip;
  - a first conductive wire connecting the first contact pad with the second contact pad;
  - a second conductive wire connecting the second ground pad with the ground substrate;
  - an encapsulant material encapsulating the chip, the first and second conductive wires; and

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a plurality of solder balls attached to the ball pad and the first ground pad.  
(emphasis added).

Claim 10 also recites the similar features.

Aquien et al. do not teach the carrier 10 has two parts, one is a ground substrate and the other one is a heat spreader. Moreover, The wire bond connection 28 is directly bonded onto the substrate 20 but the present invention teaches a conductive wire connects a ground pad on a chip with a ground substrate. The cavity down ball grid array packaging carrier of the present invention are designed in different way not like the reference taught by Aquien et al.

Mihara disclose a GND solid layer 231b that belongs to one of the patterned wiring layer of a substrate (From Fig. 8), not like the ground substrate of the present invention. The ground substrate of the invention is thicker than the GND solid layer 231b recited by Mihara and does not belong to one of the patterned wiring layer of the substrate. Mihara disclose wires 209 are directly bonded onto the substrate (From Fig. 8) but the present invention teaches a conductive wire connects a ground pad on a chip with a ground substrate. The structure shown in Fig. 8 is significantly different from that of the present invention.

Besides, in Fig. 1 of the reference by Mihara, vias are directly positioned under solder balls 105 but the present application claims ground pads are spaced from and electrically connected to vias. Therefor, the ground pads are relatively more planar and conformal to orientation of the circuit substrate surface and height difference between the solder balls formed

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on the ground pads can be controlled within a favorably reduced range. (From paragraph [0031])  
The structure shown in Fig. 1 recited by Mihara can not attain the advantage of the above-mentioned and is significantly different from that of the present invention.

For at least the foregoing reasons, Applicant respectfully submits that independent claims 1 and 10 patently define over the prior art references, and should be allowed. For at least the same reasons, dependent claims 7, 8, 13 and 14 patently define over the prior art as well.

### CONCLUSION

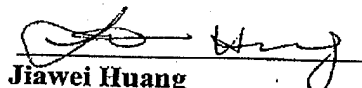
For at least the foregoing reasons, it is believed that the pending claims 1, 7, 8, 10, 13, 14 are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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